

# Illicit Discharge Detection and Elimination: Overview



Lake County Stormwater  
Management Commission  
March 20, 1012  
North Chicago, IL

Presented By:  
Deb Caraco  
**Center for Watershed Protection**

# Center for Watershed Protection

- ▶ National non-profit 501(c)3, non-advocacy organization
- ▶ Mission: to protect, restore, and enhance our streams, rivers, lakes, wetlands, and bays.
- ▶ Provides technical assistance and tools to watershed groups, local, state, and federal governments
- ▶ 20 staff in MD, VA, & NY

[www.cwp.org](http://www.cwp.org)

[www.forestsforwatersheds.org](http://www.forestsforwatersheds.org)

[www.cbstp.org](http://www.cbstp.org)

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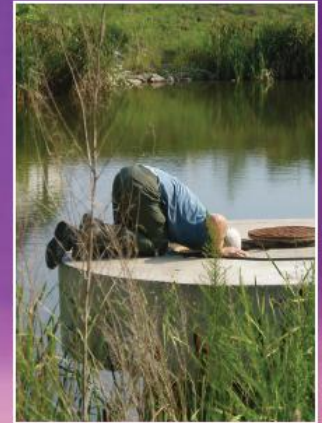
# WELCOME TO THE **WATERSHED** *Hon!*

THE CENTER FOR WATERSHED PROTECTION'S  
**20-Year Anniversary**  
**Watershed & Stormwater Conference**  
Baltimore, Maryland • October 8-10, 2012

- Get your head out of the office (or the riser) and learn from the experts during facilitated, interactive panel discussions and technical sessions, including:

- watershed stewardship
- stormwater management
- IDDE and gross solids
- ESC
- stream restoration
- permits and regulation
- financing
- agriculture

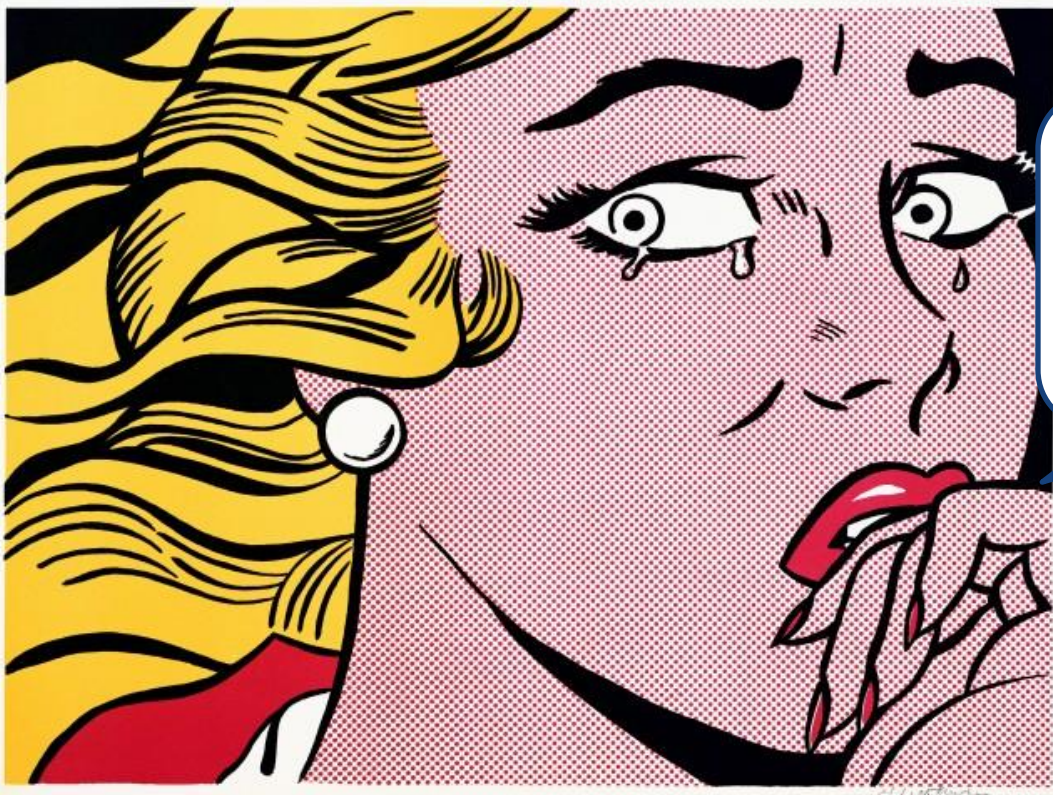
- See presentations on innovative practices, programs, and design tools by industry experts, consultants, and federal, state, and local officials
- Attend the first membership meeting of the Association of Watershed & Stormwater Professionals



Learn more about the Conference at [www.CWP2012EVENT.com](http://www.CWP2012EVENT.com)



# IDDE: The Most Terrifying of the Minimum Measures



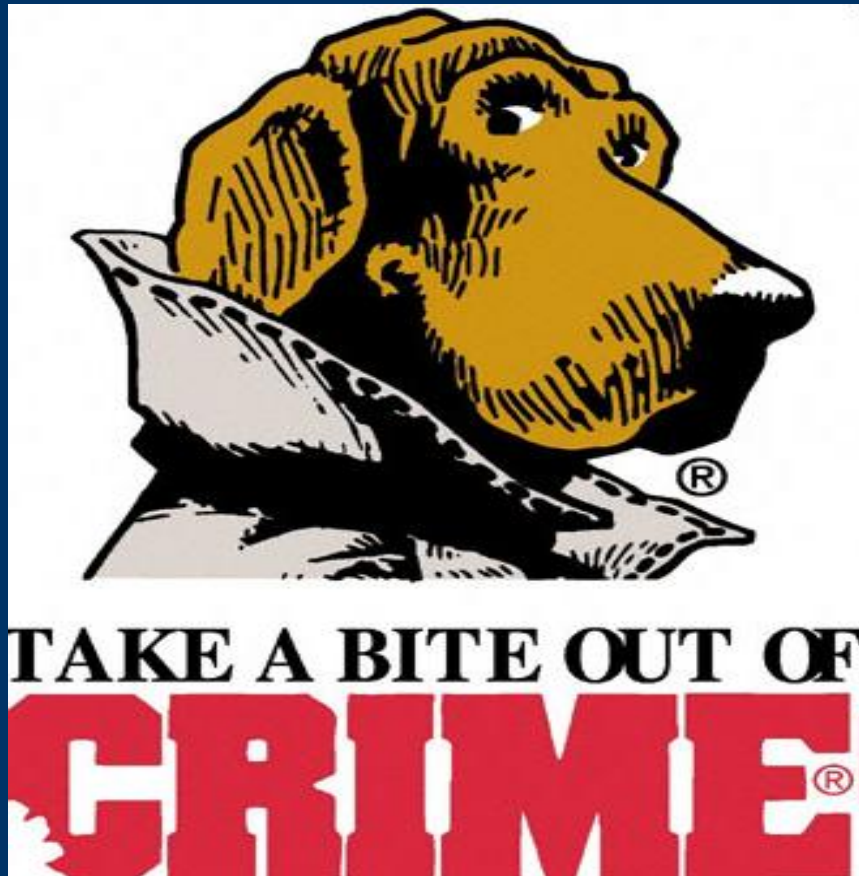
What's coming  
from that  
outfall?

# IDDE: Chicago Style



- ▶ Illicit Discharges: They're the Law
- ▶ What are Illicit Discharges?
- ▶ Program elements needed to fix them

# IDDE: It's the Law



# Phase II Program Requirements

(Source: 64 FR 68722 – December 8, 1999)

- ▶ Storm sewer system map
- ▶ Regulatory mechanism (e.g. ordinance) to prevent illicit discharges
- ▶ Plan to detect & address non-storm water discharges
- ▶ Education
- ▶ Measurable goals



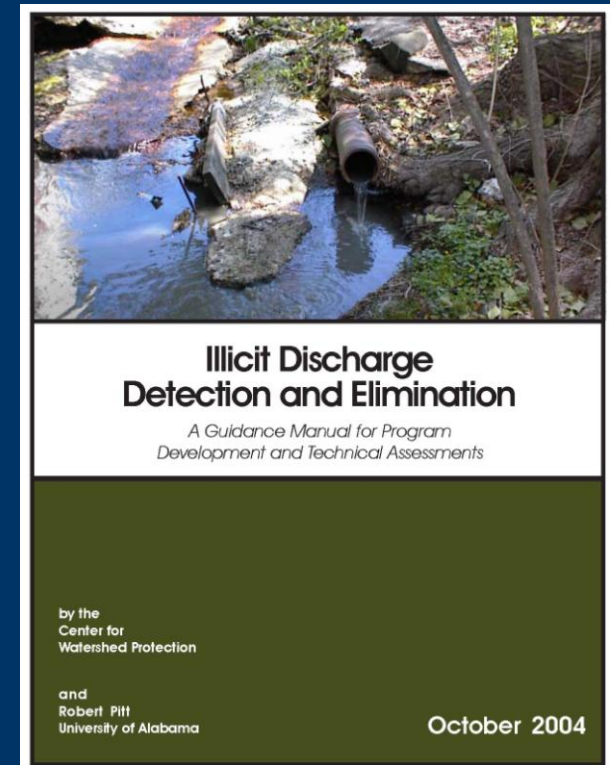
# Phase II Program Requirements (EPA Guidance)

- ▶ Plan to detect and address illicit discharges should include:
  - Procedures for locating priority areas likely to have illicit discharges
  - Procedures for tracing the source of an illicit discharge
  - Procedures for removing the source of the discharge, and
  - Procedures for program evaluation and assessment



# IDDE Guidance Manual

- ▶ Joint EPA-funded project between CWP and University of Alabama
- ▶ 8 Program Components
- ▶ Desktop Methods
- ▶ Field and Lab Protocols
- ▶ Model Ordinance
- ▶ Technical Appendices
- ▶ Download at [www.cwp.org](http://www.cwp.org) or <http://cfpub.epa.gov/npdes/>



# Some Key Terms



- ▶ Illicit Discharge
- ▶ Storm Sewer
- ▶ Outfall
- ▶ Discharge Frequency
- ▶ Flow Type
- ▶ Mode of Entry
- ▶ Generating Sites

# What is an Illicit Discharge?

- ▶ A discharge to an MS4 that is **not composed entirely of storm water** except permitted discharges and fire fighting related discharges  
40 CFR 122.26(b)(2)



# What is a Storm Sewer?



- ▶ Enclosed pipe or open channel
- ▶ From a regulatory standpoint (40 CFR 122.26(b)(5)):
  - Major outfall = enclosed storm drain pipes 36 inches or greater in diameter & open channels that drain more than 50 acres
  - For industrial land uses, major outfall = enclosed storm drain pipes 12 inches or greater in diameter & open channels that drain more than 2 acres
- ▶ Minor storm outfalls are smaller than these thresholds



I said we will be  
counting outfalls  
< 6" in diameter!



Both major & minor storm outfalls can be a  
source of illicit discharges & both merit  
investigation

# Discharge Frequency: How Often Does the Crime Occur?

- ▶ **Continuous discharges**
- ▶ **Intermittent discharges**
- ▶ **Transitory discharges**

# Continuous Discharges: Pervasive Crime Element

- ▶ Occur all or most of the time
  - Broken sewage pipes
  - Direct connections (sometimes)
- ▶ Worst pollutant source
- ▶ Easiest to find



# Best ways to Deal with Continuous Discharges

- ▶ Crime Sweep
- ▶ Outfall surveys
- ▶ Track discharges to the source.





# Intermittent Discharges: The Cat Burglar

- Occur over a ***shorter period of time*** (e.g., a few hours per day or a few days per year)
- Likely to come back
- May “miss them” if you don’t look for clues and patrol regularly
- Examples:
  - Many cross connections
  - Most industrial connections (e.g., “wash down” at the end of the shift)



# Best Ways to Deal with Intermittent Discharges

- ▶ ORI, but look for signs of past flows.
- ▶ Look at different hours/ days
- ▶ Use “eyes on the ground” (e.g., hotlines or citizen reporting).



# Transitory Discharges: The Big Fix

- ▶ Occur once or infrequently
- ▶ Examples Include:
  - Spills
  - One-Time Dumping



# Best Ways to Fix Transitory Discharges

- ▶ Education
- ▶ Prevention measures
- ▶ Safety/ Response Plans





# Fingerprinting: Discharge Flow Types

- ▶ Sewage & septage flows
- ▶ Washwater flows
- ▶ Liquid wastes
- ▶ Tap water \*
- ▶ Landscape irrigation flows \*
- ▶ Groundwater & spring water flows \*

\* Not typically considered illicit



# Mode of Entry: How Did the Criminal Gain Access?

## ► *Direct entry (Break-In)*

- Sewage, industrial, commercial cross-connection
- Straight pipe



## *Indirect entry (Via an Intermediary)*

- Groundwater seepage
- Spills
- Dumping
- Outdoor washing activities
- “Nuisance” or non-target water



# Land Use & Potential Generating Sites: Identifying the Criminal Element

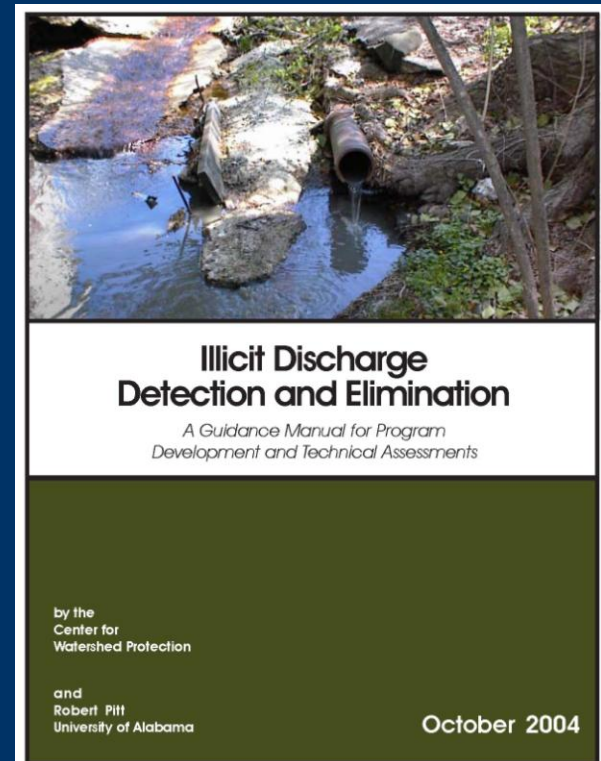
- ▶ Residential
- ▶ Commercial
- ▶ Industrial
- ▶ Institutional
- ▶ Municipal



# IDDE Guidance Manual

## 8 Program Components

1. Audit Existing Resources & Programs
2. Establish Responsibility / Authority
3. Complete a Desktop Assessment of Illicit Discharge Potential
4. Develop Program Goals & Implementation Strategies
5. Search for Illicit Discharge Problems in the Field
6. Isolate & Fix Individual Discharges
7. Prevent Illicit Discharges
8. Evaluate the Program





# Program Audit: Staffing Your Force

- Determine the most capable local agency to run program
- Identify available staffing, resources and gaps
- Understand local resources, expertise that can be applied

# Audit Elements

- ▶ Infrastructure profile
- ▶ Legal authority
- ▶ Available mapping
- ▶ Field staff
- ▶ Access to lab services
- ▶ Education & outreach resources
- ▶ Discharge removal capability
- ▶ Program budget & financing

## Potential Infrastructure Profile Questions:

How many miles of streams and storm drains exist in the MS4?

What is the area served by storm drains, sewers, and septic?

What is the general age and condition of the infrastructure?

# Legal Authority: Get Something on the Books

## ► Purpose:

- Establish authority to regulate, respond to & enforce discharges
- Identify & prohibit inappropriate connections through plumbing code updates
- Develop reporting & tracking system

# Desktop Assessment: What do we know?

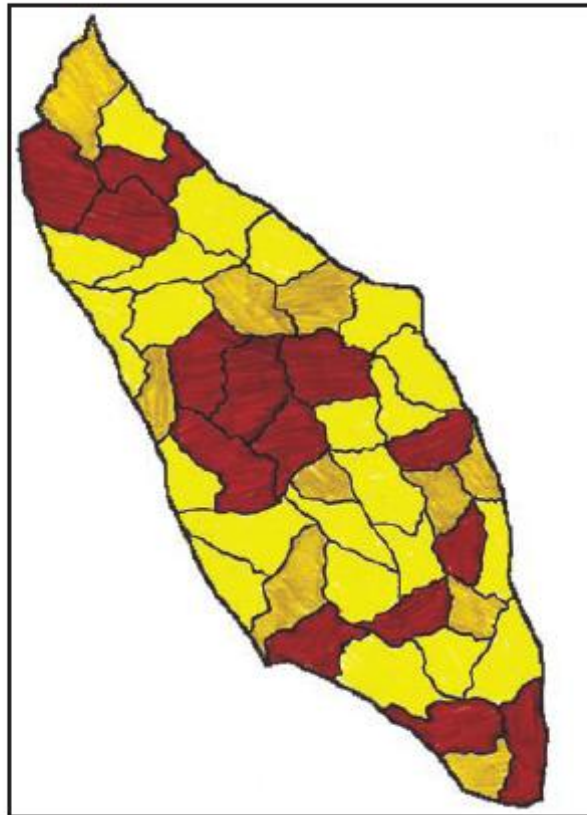
- ▶ Past complaints
- ▶ Infrastructure age
- ▶ Water Quality
- ▶ Potential Hotspots
- ▶ Taken together, identify the “Illicit Discharge Potential”

# Desktop Assessment: Initial Risk Assessment

- ▶ Understand the potential risks
- ▶ Elements:
  - Define drainage areas
  - Compile data
  - Screen drainage areas for IDP factors
  - Characterize IDP across subwatersheds



# Results of the Desktop Assessment



*Key:*

- Low IDP risk
- Medium IDP risk
- High IDP risk

# Goals and Strategies: Initial Plan of Action

- ▶ Based on the results of the Desktop Assessment
- ▶ Define milestones to measure progress during 1st permit cycle
- ▶ Make sure resources allocated to address real problems
- ▶ Choose most appropriate & cost-effective methods to find discharges
- ▶ Detailed yet flexible field investigation strategy

# Measurable Goals Related to Outfall Assessment

Example Measurable Goals	Timeframe
Define & characterize drainage areas or sewer sheds	Year 1
Walk all stream miles	Begin Year 1, complete 1 <sup>st</sup> screening end permit cycle Repeat once per permit cycle
Develop digital map of all outfalls, land use, & other relevant infrastructure	Year 1 Continuously & regularly after that
Secure analytical laboratory services	Initiate in conjunction with field screening
Sample & trace source of % of flowing outfalls each year of permit cycle	Initiate during 1 <sup>st</sup> permit cycle Expand & enhance where problems are observed
Conduct regular in-stream assessments	
Conduct investigations at % of non-flowing outfalls with poor in-stream water quality to look for intermittent flows	
Integrate all collected stream data & citizen complaints into GIS system	Initiate during 1 <sup>st</sup> year Expand & enhance with time

# Other Elements of the Strategy

- ▶ Timeline for developing an ordinance.
- ▶ Removal strategies
- ▶ Techniques to reduce dumping.
- ▶ Source/ hotspot assessments

# Refining Strategies to Address Unique Conditions... Aging Septic Infrastructure

- ▶ Develop targeted education program for septic system maintenance
- ▶ Institute a point of sale inspection and verification process
- ▶ Develop cost share capabilities to assist property owners with upgrade of system





# What could you do if.....

- ▶ There are minimal illicit discharge problems anticipated throughout the MS4.

# What could you do if...

- ▶ The anticipated problems are confined to a few subwatersheds or reaches, where a history of suspect discharges exist or in-stream dry weather water quality is consistently poor.

# What could you do if.....

- ▶ The community has chronic dumping areas.

# What could you do if.....

- ▶ Community used to be on combined sewer system or existing sanitary sewer infrastructure is old & has history of problems .

# What could you do if.....

- ▶ Significant illicit discharges are suspected throughout jurisdiction & across all land uses.



# Search for Discharges: The Crime Sweep

## ► Purpose:

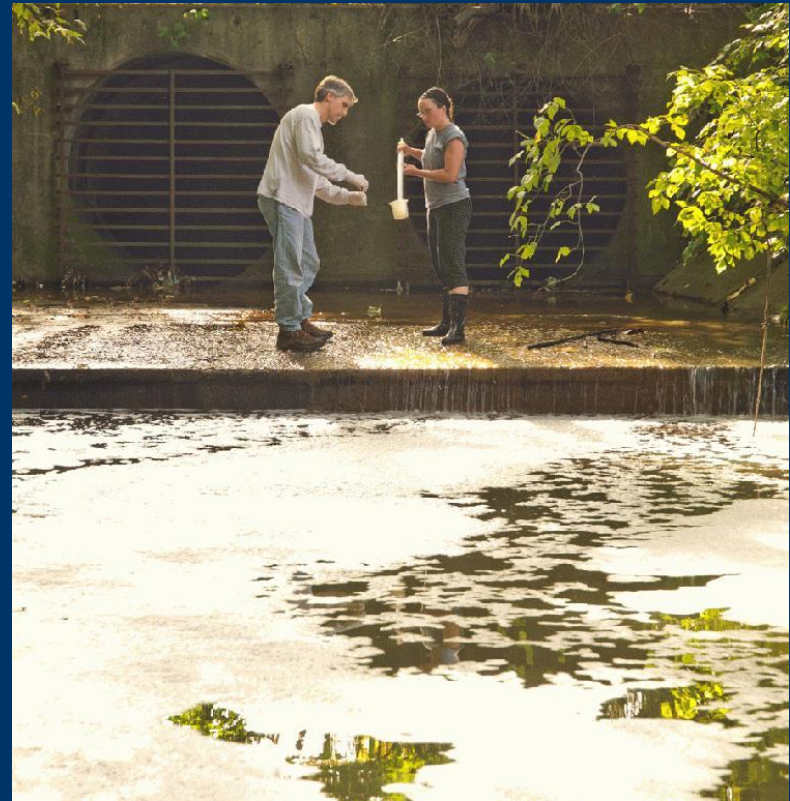
- Conduct rapid field screening to identify & track suspected outfalls & stream segments
- Conduct investigatory sampling & analysis to establish flow types & likely sources

## ► Desired Outcome:

- Locations & characterizations of all outfalls
- Strategy for future chemical analysis
- Local “fingerprint” library

# Outfall Reconnaissance Inventory: Boots on the Ground

- ▶ Rapid screening tool for identifying discharges on the ground
- ▶ Identifies discharges or discharge potential based on physical and chemical data.



# Lab Rats: Chemical Data to Identify Discharges

- ▶ Identify discharges based on their chemical fingerprint
- ▶ Use to data develop a “discharge library”



# Isolate & Fix Illicit Discharges: Tracking them Down

- ▶ Track down within the storm drain system.
- ▶ Sometimes uses advanced GIS applications.
- ▶ Often done in the field to trace to the source.





# “Hotspot Inventory”: Evaluate Potential Problem Areas



The background of the slide features an aerial photograph of a watershed. Yellow lines delineate various sub-watersheds or land use zones, while orange lines highlight specific areas of interest. The terrain includes a mix of forested land, urban areas, and open fields.

## The Hotspot Source Investigation (HSI)



# Neighborhood Source Assessment (NSA)

**Assess for each neighborhood:**

- ▶ **Yards and Lawns**
- ▶ **Driveways, Sidewalks and Curbs**
- ▶ **Common Areas**

**Also complete:**

- ▶ **Neighborhood Characterization**
- ▶ **Initial Assessment and Recommendations**



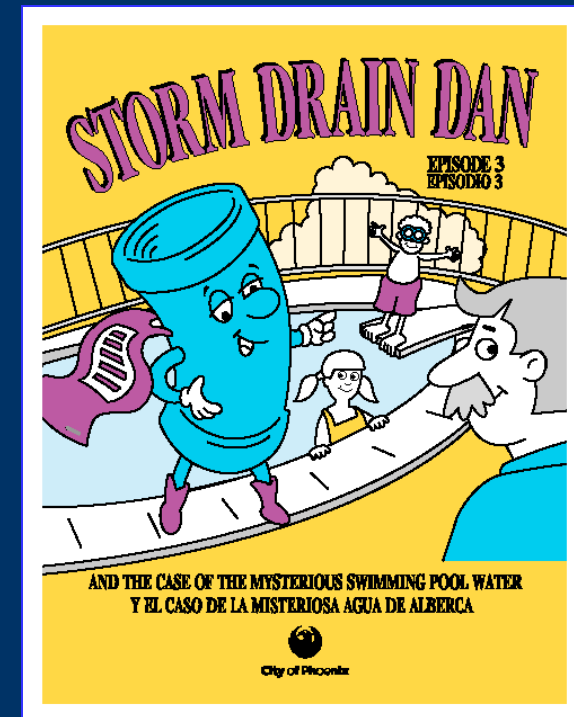
# Discharge Complaint Hotline

- ▶ Leads to early detection & correction
- ▶ Encourages active public stewardship
- ▶ Can “piggyback” on other call response needs
- ▶ Identifies suspected facilities for further investigation & education
- ▶ Increases municipal accountability



# IDDE Education Target Audiences

- ▶ Resident Education
  - Storm drain stenciling, outfall signage, hotline promotion, school presentations
- ▶ Commercial and Industrial Hotspots
- ▶ Public Employees
  - Field crew & inspector cross-training



Source: City of Phoenix, AZ

Audit

Authority

Desktop  
Assessment

Goals &  
Strategies

Search for  
Discharges

Isolate & Fix  
Discharges

Prevent  
Discharges

Tracking &  
Evaluation

[http://www.youtube.com/watch?feature=player\\_detailpage&v=stbOJWT38WI](http://www.youtube.com/watch?feature=player_detailpage&v=stbOJWT38WI)

# Program Tracking: Crime Statistics

- ▶ Updated mapping to reflect locations of illicit discharges and problems
- ▶ Water quality results associated with specific outfall and in-stream sampling
- ▶ Frequency of hotline use
- ▶ Number of “hits” or confirmed illicit discharges
- ▶ Program costs by line item
- ▶ Number of corrections and associated cost



# Additional Resources

All these documents can be accessed from [www.cwp.org](http://www.cwp.org)

- ▶ *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments* (CWP and Robert Pitt, 2004)
- ▶ ORI Field Sheet & Database
- ▶ Illicit Discharge Hotline Incident Tracking Sheet
- ▶ Chemical Mass Balance Model (CMBM) Setup & Input File
- ▶ *Inappropriate Discharge Detection and Elimination: What Phase I Communities Are Doing to Address the Problem* (Zielinski and Brown, 2003)

# Q/A

